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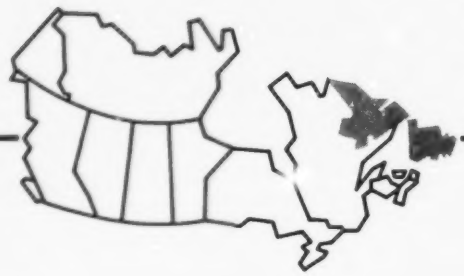
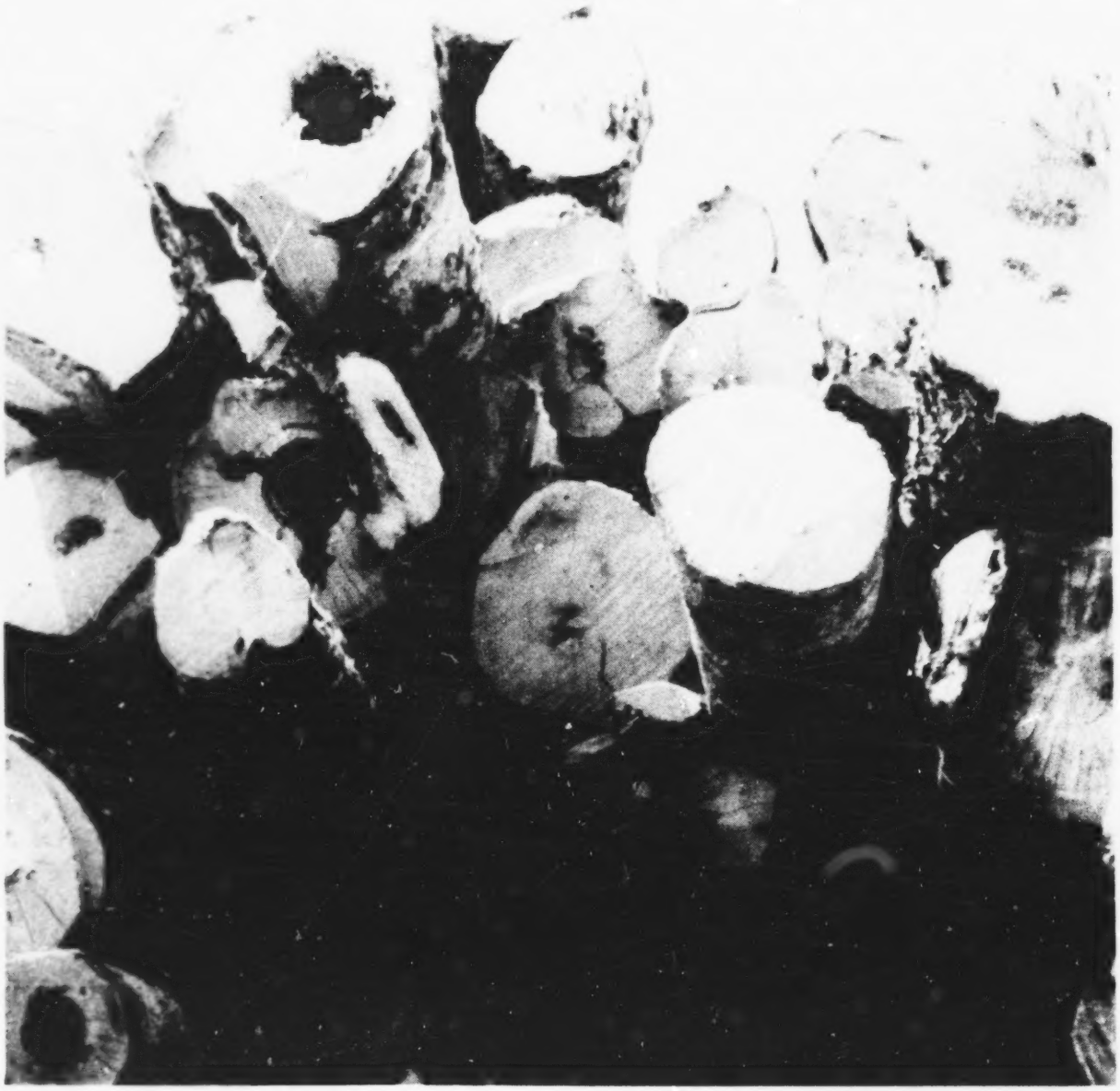
Wood defect and density studies

II Total and net volume equations for Newfoundland forest management units

G.R. Warren and J.P. Meades

Information Report N-X-242
Newfoundland Forestry Centre





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WOOD DEFECT AND DENSITY STUDIES OF LIVING TREES
II. TOTAL AND NET VOLUME EQUATIONS FOR NEWFOUNDLAND FOREST MANAGEMENT UNITS

by G.R. Warren and J.P. Meades

INFORMATION REPORT N-X-242
1986

CANADIAN FORESTRY SERVICE
NEWFOUNDLAND FORESTRY CENTRE

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ISSN NO. 0704-7657
CAT. NO. Fo46-15/242E
ISBN NO. 0-662-15316-2

Copies of this report are available at no charge from:

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ABSTRACT

This report presents the initial analysis of data collected for the Wood Defect and Density Study of Living Trees carried out in co-operation with the Newfoundland Forest Management Unit Inventory. Volume table coefficients and error coefficients to produce gross and net merchantable volumes for balsam fir and black spruce for 17 forest management units in Newfoundland and Labrador were computed. The data base consisted of 316 plots containing 2,149 balsam fir and 2,220 black spruce trees. The results indicate that there is significant variation in tree form and defect volume among management units in different regions of the province. Further analysis of the data base is planned to quantify the factors contributing to these variations.

RÉSUMÉ

Son présentés les résultats de l'analyse initiale des données recueillies pour l'étude des défauts et de la masse volumique du bois des arbres vivants effectuée de concert avec l'inventaire des unités d'aménagement forestier à Terre-Neuve. Les coefficients des tarifs de cubage et les coefficients d'erreur servant à déterminer les volumes marchands bruts et nets des sapins baumiers et des épinettes noires ont été calculés pour 17 unités d'aménagement de l'île de Terr-Neuve et du Labrador à partir d'une base de données portant sur 316 parcelles contenant 2 149 sapins baumiers et 2 220 épinettes noires. Les résultats indiquent une variation importante de la forme des arbres et du volume des défauts entre les unités d'aménagement de différentes régions de la province. Une analyse plus poussée de la base de données est prévue afin de quantifier les fdteurs influant sur ces variations.

ACKNOWLEDGEMENTS

The authors of this report would like to express appreciation to Gail Eagen of the Computing and Applied Science Directorate who prepared all the volume programs and did most of the statistical analysis of the data. The data collection would not have been possible without the co-operation of Mr. Monte Osmond of the Newfoundland Forest Service Inventory Section, Mr. George van Dusen of Corner Brook Pulp and Paper Ltd. and Mr. Fred Rowsell of Abitibi-Price Ltd. The efforts of John Marshall and Austin Fudge in crew training and sample analysis are acknowledged.

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INTRODUCTION

The losses from cull, caused by decay and form defects in living trees, can be extensive in some of the forests harvested in Newfoundland and Labrador. Therefore, it is essential for the efficient management of forest stands that a method be developed to assess these defects at various stages in stand development so that harvesting plans can be adjusted to minimize the losses.

In 1974 a Defect and Density Study was initiated in co-operation with the Newfoundland Forest Management Unit Inventory. The study objectives were: (1) to provide estimates of the volume of wood fibre lost to decay and other form defects; (2) to relate these losses to forest site and stand conditions; (3) to attempt to stratify the province into natural forest regions, based on identifiable stand factors, for which universal volume and cull tables could be developed; (4) to determine the fibre quality of commercial species in different locations by a better knowledge of wood density.

Field work has been completed for all management units and this report describes the survey methods and presents a set of preliminary equations and volume tables which should be useful in assessing defect in each management unit.

METHODS

Field Work

The data collection phase of the Defect and Density Study was conducted in cooperation with the Forest Management Unit Inventory

Program of the Newfoundland Department of Forest Resources and Lands (DFRL). There were three agencies involved in the field work, Bowater Newfoundland Limited, now Corner Brook Pulp and Paper, Abitibi-Price Inc. and the provincial inventory section of the DFRL. The DFRL and Abitibi-Price Inc. cooperated in using a stratified sampling design with temporary field plots while Bowater Newfoundland Limited had established a network of permanent field plots in the continuous Forest Inventory (CFI) System. Field crews from each participating agency collected the cull survey data and samples during the regular inventory field program. Personnel from the Newfoundland Forestry Centre provided training for the field crews and the sampling methods as outlined in the Field Guide (Laflamme et al., 1977).

Data from a previous cull study carried out in conjunction with the Global Inventory (1966-69) were used to calculate the number of sample plots necessary to estimate the percent cull within a 10% error at 95% probability for the seven regions of the Global Inventory. Within these regions the plots were distributed among management units (Fig. 1) using productive forest area of the unit as a weighing factor.

The two different inventory methods used by the cooperating agencies introduced some difference in the plot location and establishment procedures for the cull survey. Abitibi-Price Inc. and the DFRL used temporary field plots so the cull survey plots were done by cutting a sample of these plots whereas the Bowater Newfoundland Limited permanent plots were left undisturbed and a cull plot was established nearby in the same stand conditions. A summary of the number of plots and trees sampled by management unit is outlined in Table 1.

Table 1. Wood Defect and Density Sample Plot Summary by Management Units.

Management unit	No. plots	No. trees[1]	bF	bS	wS	wB	Other	Year sampled	Ownership[2]
2	13	218	59	125	3	28	3	1976	NC
4	14	263	66	189		3	5	1981	Pr
5	13	229	29	194	1	1	4	1977,78	BL,NC
6	14	174	59	114		1		1978	BL
7	14	184	126	42		6	10	1977	BL,NC
8	21	344	103	204	1	26	10	1978	BL,BP,NC
9	28	492	154	288	3	18	29	1976,77	BL,PrL,NC
10	8	184	16	145		9	14	1977	PrL
11	13	247	36	196	1	11	3	1979	PrL
12	13	271	129	97	1	8	36	1977	PrL
13	11	201	98	99		3		1980,82	PrL
14	38	496	352	89	8	23	24	1974,75	BL,BP,NC
15	32	459	373	72	9	5		1974,75,76	BL,BP
16	32	346	166	160	6	11	3	1975	BL
17	17	174	135	31	4	4		1976	BL
18	17	204	145	55	4			1976	BL,BP
19	18	233	101	120	7	2	3	1977,78	NC
Total	316	4727	2149	2220	48	159	144		

[1] Indicates total number of trees sampled in the plot, some of these trees were eliminated from the volume calculations due to broken or forked tops.

[2] Ownership B - Bowater, Pr - Abitibi Price, NC - Newfoundland Crown, L - lease, P - private.

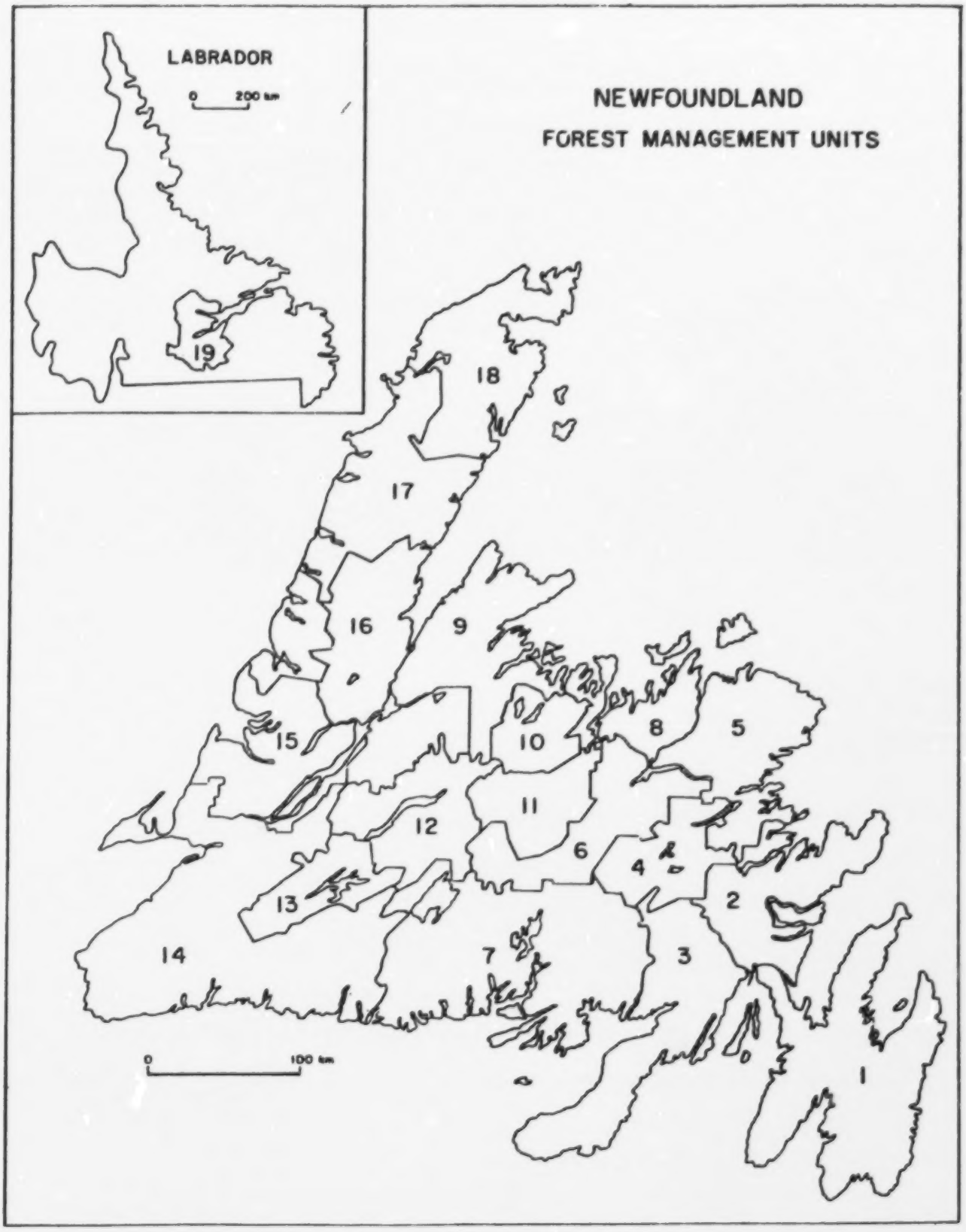

Figure 1. Forest Management Units of Newfoundland and Labrador

After the plots were established all trees over 9.0 cm DBH were cut and a detailed stem analysis was done on each tree. Data were recorded using the methods outlined in the Field Guide (Laflame, et al. 1977). Sample discs were cut from all decayed bolts for culturing and identification of causal organisms. Discs were also taken from each bolt for specific gravity determination in the laboratory. Figure 2 shows the field coding sheet used in this survey.

Volume Computations

To facilitate the volume computations and statistical analysis of results, a series of computer programs were developed by the Computing and Applied Statistics Directorate, Environment Canada. All data from the field coding sheets were key punched, edited and stored on magnetic tape. When the data from each management unit was complete, the volume program was run and the individual total volume, gross merchantable volume, cull volume and the volume of each decay type and form defect were calculated for each tree. The output from the volume program was stored on a summary tape which included the information describing the plot parameters as well as the individual volumes. The documentation and listings of the computer programs used in this study are available from the Newfoundland Forestry Centre.

Specific Gravity

A 5 cm disc was collected from each 1.22 m bolt from each tree sampled. The mean radius was marked on each disc and a wedge shaped sample was forwarded to the laboratory. The sample wedges were cut into four quarters, one for increment measurements, two for specific gravity

CULL SURVEY STEM ANALYSIS FORM

TREE NO. _____ Height Increments: Last 5 Yrs _____ 10 Yrs _____ Recorded by:_____ Date: _____

Tree I.D. No.	FC	Rt	Spec.	MU	Watershed	Map	OW	Plot	Stand Type	Stratum	Ft	Slope	AS	SM	To
1 5	7	8	9	11	13	17	20	23	27 30 35 39	40	44	46	49	51	52
		H													

TC	SS	I.D	CC	DBH	Ht.Cr.	Ht. 7.6 cm	Tot. Hgt.	Blts	St. age	Bh. age
33	34	35	37	38	41	44	48	72	74	77
				.	.	.	.			

Rt	Bolt No	B C	Dob.	Dib.	F D	Section 1 2 3 4	F D	Section 1 2 3 4	Ind. sec	Ind. sec	Decay Description & Measurement P	A	I	D/R-A	D/R-I	L-A	L-I	D T	Decay org.	Density	R W
8	9	11	12	15	18	19	23	24	28	30	32	33	34	35	38	41	44	47	48	51	54
B			.	.										.	.	.	.				
B			.	.										.	.	.	.				
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Figure 2. Field Data Coding Form.

analysis and one for chemical analysis. Specific gravity determinations were done using a balance interfaced to a desk top computer. All specific gravity data were stored on digital cassettes and transferred to the main data base in Ottawa using data communication facilities. The laboratory procedures were according to Canadian Pulp and Paper Association Standard A1 (1950).

Data Analyses

Each management unit was analysed separately and until the project was completed no analysis of the similarities or differences among units could be attempted. Many of the units sampled for cull by Bowater Newfoundland Limited had not yet been photographed and classified by the DFRL so that parameters such as stand type, stratum and productivity classes were only available for part of the data base.

For each management unit the single tree data were summarized by plot. Tables and graphs were prepared showing the weighed average volumes and incidence of defects for the unit as a whole. In order to provide a more accurate method of assessing defect during intensive surveys, local volume tables which predict gross and net merchantable volume as a function of height and diameter were developed.

Total Cubic Metre Volume Equation

The total volume equation developed by Honer (1965a, 1965b, 1967) was used to prepare the single tree total volume tables for each management unit sampled. All data for balsam fir and black spruce were run through a multiple linear regression computer program and coefficients were developed for each species for each management unit.

The program produces a least squares fit for the equation.

$$\frac{D^2}{GTV} = a + b\,\frac{(1)}{(H)}$$

where D = diameter at breast height

GTV = gross total volume

H = total tree height

a, b = regression coefficients

To estimate tree volume for any combination of diameter and height the equation is transformed to

$$GTV = D^2/a + b\,(1/H)$$

To provide a useful estimate of the error volume throughout the full range of diameters and heights in the table, an error equation was developed by fitting a polynomial to the residuals and observed values from the total volume regression. The form of this equation is

$$Y = d + ez + fz^2$$

where Y = [GTV(obs) - GTV (exp)] = residual from regression

Z = GTV (exp)

d, e, f = regression coefficients

Having this, the error volume can be predicted for a tree of any given diameter and height. If this equation is included in survey volume computations, the overall error in volume estimation for stands of varying height and diameter can be accurately estimated and expressed in cubic metres.

Merchantable Cubic Metre Volume Table

The merchantable volume tables were prepared by using a modification of the method described by Honer (1967). For any utilization level involving different specifications for stump height, top diameter or merchantable length, merchantable cubic metre conversion factors can be computed from equations which describe the distribution of volume over the tree stem. The utilization specification for Newfoundland is 0.1524 m (6 inch) stump height and 7.6 cm (3 inch) inside bark top diameter. These parameters were used to fit the following conversion factor equation:

$$Y = a + bX + cX^2$$

where Y = ratio of merchantable to total volume
a,b,c = regression coefficients

$$X = \left(\frac{d}{dbh}\right)^2 \left(1 + \frac{h}{H}\right) = \left(\frac{7.6}{dbh}\right)^2 \left(1 + \frac{.1524}{H}\right)$$

dbh = diameter at breast height
H = total tree height

All trees in each unit were run through the regression program. For each species in each unit the following conversion factors were computed:

a) Ratio of gross merchantable volume to total volume

b) Ratio of net merchantable volume with cull[1] deducted to total volume

c) Ratio of net merchantable volume with total decay deducted to total volume

d) Ratio of net merchantable volume with advanced decay deducted to total volume

Using the coefficients from the ratio equations, merchantable volume tables can be prepared from the following relationship

$$Vm = V_T (a + bX + cX^2)$$

where Vm = merchantable volume

V_T = total tree volume

a,b,c = regression coefficients

$$X = \left(\frac{7.6}{dbh}\right)^2 \left(1 + \frac{.1524}{H}\right)$$

Computer programs were written to produce the following tables for each management unit:

a) Gross merchantable volume

b) Percent error of gross merchantable volume

c) Net merchantable volume cull deducted

d) Percent merchantable volume cull

e) Net merchantable volume total decay deducted

---

[1]Cull specifications for forest inventory in field guide (Laflamme et al. 1977).

f) Percent merchantable volume total decay

g) Net merchantable volume advanced decay deducted

h) Percent merchantable volume advanced decay

RESULTS AND DISCUSSION

Total Tree Volume Table

The coefficients for the total volume equation and its error equation were computed for balsam fir and black spruce for each management unit and are shown in Table 2. These coefficients and the total volume equation were used to construct the gross total volume table, stump and top included, presented in Appendix I. The error equation was used to generate a table of the percentage error of the estimate for each value in the total volume table. This error table is very useful in evaluating the effect of the percent error over the range of values in a volume table (e.g. a large percentage error in small trees may be acceptable whereas a small percentage error in large trees can produce large errors in cruise results).

At the present time, one total volume table (Ker, 1974) is being used for all management units on the Island. This table is a metric conversion of the table presented by Page et al. (1971). To determine if the tables produced for individual management units would show any significant divergence from the Ker tables, a table of the percentage difference between the unit tables and the Ker table was computed. The comparison indicates that for balsam fir the Ker tables produce significant overestimates in single tree volumes in management units 16, 17, 18 and 19.

For black spruce the Ker table underestimates the total volume significantly in units 2, 6, 7 and 19, and overestimates the volume in units 15, 17 and 18. The impact of these differences on management unit volume estimates needs to be investigated.

Gross Merchantable Volume Tables

The gross merchantable conversion function at the utilization level of 0.1524 m stump height and 7.6 cm top diameter was computed for balsam fir and black spruce for each management unit. An error equation was developed from the residuals of the regressions. It should be noted that since the merchantable volume is calculated by applying a conversion factor to the total volume, the actual error in the merchantable volume is the sum of the total volume table error and the merchantable volume table error. The coefficients for the merchantable volume conversion equation and its error equation are shown in Table 3. An example of the gross merchantable volume and percent error tables constructed from the above coefficients is presented in Appendix I. The same differences of single tree merchantable volume estimate between the Ker table and the management unit tables, as existed for total volume were noted.

Net Merchantable Volume Tables

Coefficients were developed for the merchantable volume conversion function to estimate the net merchantable volume for the following defect types, net merchantable volume with cull deducted, net merchantable volume with the total decay deducted and net merchantable volume with only advanced decay deducted. The coefficients of the conversion

function and its error equation are shown in Tables 4, 5 and 6. Example net merchantable volume tables constructed for each defect type are presented in Appendix I.

COMMENTS

Only the volume equations and their respective coefficients have been presented in the text of this report. Too much space would be required to include the volume tables for all the management units. The equations and respective coefficients have been provided for those having the facilities to construct the tables of their interest. Appendix I demonstrates an example of the volume tables constructed for Management Unit 12. Copies of the volume tables for each management unit are available from the Newfoundland Forestry Centre in St. John's upon request.

Although these tables are primarily intended for use as a tool in assessing defect in forest inventory, a comparison of the management units revealed that the percentage defect in balsam fir is very high in the units in central Newfoundland as compared to the eastern and western units. This can be attributed to the high incidence of advanced trunk and butt rot in the central region. The data will be reanalyzed to improve accurate identification of the sites and stands more susceptible to butt and trunk decay.

Specific gravity data for all the management units has been completed and inputted into the computer. Analysis and presentation of this data, in a similar forest management unit format, will be available in the near future.

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Table 2. Total Volume Table Statistics

Unit	Species	No. of trees	Volume coefficients a	b	Error coefficients d	e	f
2	bF	57	262.322	22 922.7	0.0011	0.0819	0.0000
	bS	126	103.609	24 081.6	0.0052	-0.0634	0.5959
4	bF	66	437.800	24 897.0	0.0042	0.1455	-0.7318
	bS	184	265.500	25 703.0	0.0013	0.0106	-0.2484
5	bF	115	539.470	21 248.6	0.0016	0.0763	0.0000
	bS	197	701.669	18 339.2	-0.0010	0.0937	0.0000
6	bF	166	-137.705	29 503.7	0.0048	0.0000	0.2590
	bS	152	221.735	26 194.7	-0.0029	0.1238	-0.1772
7	bF	166	-137.705	29 503.7	0.0048	0.0000	0.2590
	bS	152	221.735	26 194.7	-0.0029	0.1238	-0.1772
8	bF	115	539.470	21 248.6	0.0016	0.0763	0.0000
	bS	197	410.642	20 619.1	0.0046	0.0783	0.0000
9	bF	110	422.533	22 409.0	-0.0030	0.0633	0.0000
	bS	290	637.508	19 483.9	0.0019	0.0645	0.0000
10	bF	89	223.389	25 844.6	0.0011	0.0834	0.0000
	bS	148	232.837	25 533.5	0.0089	-0.1787	0.9823
11	bF	114	-250.162	32 290.9	-0.0024	0.0590	0.0000
	bS	164	250.038	25 895.4	0.0028	0.0000	0.1935
12	bF	89	223.389	25 844.6	-0.0011	0.0834	0.0000
	bS	74	564.943	21 351.5	0.0033	0.0000	0.2968
13	bF	97	118.500	27 712.0	-0.0015	0.1047	-0.6947
	bS	96	61.300	28 162.0	-0.0016	0.0984	-0.7640
14	bF	263	341.891	23 397.3	0.0013	0.0833	0.0000
	bS	59	493.562	21 638.5	0.0019	0.0338	0.0000
15	bF	347	355.127	23 577.2	-0.0006	0.0921	0.0000
	bS	69	359.545	24 820.5	0.0017	0.0697	0.0000
16	bF	159	976.679	19 124.8	0.0029	0.0402	0.0000
	bS	149	434.071	21 962.4	0.0001	0.0593	0.0000
17	bF	126	363.236	28 987.6	-0.0016	0.1403	0.0000
	bS	29	315.579	30 525.9	0.0001	0.0805	0.0000
18	bF	138	316.467	30 434.1	0.0010	0.0678	0.0000
	bS	55	738.709	28 667.6	0.0019	0.0198	0.0019
19	bF	83	631.598	23 697.4	-0.0039	0.1886	-0.1981
	bS	96	353.675	24 667.5	0.0034	0.0000	0.3335

Table 3. Gross Merchantable Volume Table Statistics

Unit	Species	No. of trees	Volume coefficients			Error coefficients		
			a	b	c	d	e	f
2	bF	57	0.974644	-0.132053	-0.297085	0.0016	0.0000	0.0037
	bS	126	0.948870	0.033554	-0.538523	0.0011	-0.0019	0.0000
4	bF	66	0.980180	-0.158500	-0.270800	-0.0043	0.1455	-0.7318
	bS	184	0.956930	0.014500	-0.524730	0.0003	-0.0107	-0.0747
5	bF	115	0.974823	-0.123923	-0.216385	0.0009	0.0015	0.0000
	bS	197	0.967710	-0.075511	-0.296611	0.0008	0.0000	0.0140
6	bF	166	0.965777	-0.001240	-0.423416	0.0013	0.0017	0.0000
	bS	152	0.979041	-0.136302	-0.270339	0.0256	0.0606	0.0000
7	bF	166	0.965777	-0.001240	-0.423416	0.0013	0.0017	0.0000
	bS	152	0.970494	-0.136302	-0.270339	0.0256	0.0606	0.0000
8	bF	115	0.974824	-0.123923	-0.216385	0.0009	0.0015	0.0000
	bS	197	0.972089	-0.091555	-0.265896	0.0010	0.0145	0.0000
9	bF	110	0.980294	-0.171247	-0.238653	0.0009	0.0021	0.0000
	bS	290	0.991722	-0.295545	0.005044	0.0013	0.0021	0.0111
10	bF	89	0.971973	-0.079675	-0.384698	0.0009	0.0000	0.0101
	bS	148	0.973079	-0.078912	-0.382876	0.0007	0.0000	0.0090
11	bF	114	0.908867	0.502039	-1.654068	-0.0004	0.2331	-0.1108
	bS	164	0.976197	-0.111445	-0.329052	0.0004	0.0083	-0.0224
12	bF	89	0.971973	-0.079675	-0.384698	0.0009	0.0000	0.0101
	bS	74	0.976105	-0.143720	-0.209912	0.0012	0.0000	0.0074
13	bF	97	0.956050	0.000140	-0.487000	-0.0005	0.0105	-0.0013
	bS	96	0.965110	-0.044240	-0.446500	-0.0004	0.0110	-0.0388
14	bF	263	0.982777	-0.251265	-0.061656	0.0030	-0.1213	0.0220
	bS	59	0.982363	-0.223579	-0.196220	0.0009	0.0028	0.0000
15	bF	347	0.979869	-0.149891	-0.270167	0.0010	0.0045	0.0000
	bS	69	0.989523	-0.264598	-0.200187	0.0009	0.0028	0.0000
16	bF	159	0.975378	-0.269972	-0.117096	0.0009	0.0034	0.0000
	bS	149	0.969936	-0.125432	-0.346514	0.0006	0.0056	0.0000
17	bF	126	0.978818	-0.214649	-0.234138	0.0010	0.0480	0.0000
	bS	29	0.973515	-0.175156	-0.397072	0.0009	0.0028	0.0000
18	bF	138	0.977993	-0.194250	-0.434036	0.0010	0.0007	0.0000
	bS	55	0.983174	-0.256851	-0.405720	0.0008	0.0068	-0.0529
19	bF	83	0.984417	-0.212482	-0.184066	0.0011	0.0016	0.0000
	bS	96	0.965961	-0.074168	-0.411016	0.0010	0.0000	0.0394

Table 4. Net Merchantable Volume Table Statistics Cull Deducted

Unit	Species	No. of trees	Volume coefficients			Error coefficients		
			a	b	c	d	e	f
2	bF	57	0.983241	-0.226207	-0.204599	0.0022	0.0000	-0.0007
	bS	126	0.908028	0.177130	-0.691993	0.0011	0.0100	0.1034
4	bF	66	0.688400	1.231800	-2.065200	0.0073	-0.3054	2.0749
	bS	184	0.926450	-0.056100	-0.410300	0.0008	-0.0323	0.2318
5	bF	115	0.679888	1.264810	-1.924350	-0.0023	0.2222	0.0000
	bS	197	0.913574	0.151089	-0.548499	0.0007	0.0518	0.0000
6	bF	166	0.698104	1.119163	-1.829755	-0.0038	0.2343	0.0000
	bS	152	0.823445	0.509031	-1.113124	0.0033	0.0000	0.5072
7	bF	166	0.698104	1.119163	-1.829755	-0.0038	0.2343	0.0000
	bS	152	0.823445	0.509031	-1.113124	0.0033	0.0000	0.5072
8	bF	115	0.679888	1.264810	-1.924350	-0.0023	0.2222	0.0000
	bS	197	0.979059	-0.241433	-0.073420	0.0021	0.0121	0.0000
9	bF	110	0.979256	-1.086146	1.145851	0.0016	0.0030	0.0000
	bS	290	0.831684	0.026773	-0.004683	-0.0003	0.0647	0.0000
10	bF	89	0.582519	2.140849	-3.303438	0.0027	0.0000	0.8097
	bS	148	0.852451	0.434123	-0.996256	0.0019	0.0000	0.3810
11	bF	114	0.995985	-0.211412	-0.689281	0.0034	0.0000	-0.0714
	bS	164	0.968237	-0.173999	-0.287188	0.0020	0.0160	0.0000
12	bF	89	0.582519	2.140849	-3.303438	0.0027	0.0000	0.8097
	bS	74	0.213688	4.349150	-6.086958	0.0260	-0.7860	6.4088
13	bF	97	0.544490	1.733600	-2.449300	-0.0040	0.0779	0.0537
	) 3	96	0.848680	0.324900	-0.882100	-0.0011	0.0247	-0.0448
14	bF	263	0.960489	-0.274860	0.712432	0.0010	0.0685	0.0000
	bS	59	0.973822	-0.487512	0.243262	0.0038	0.0679	0.0000
15	bF	347	0.960812	-0.274860	0.712432	0.0004	0.0348	0.0000
	bS	69	1.135679	-1.855460	2.116070	0.0067	0.0295	0.0000
16	bF	159	0.978513	-0.680124	0.664771	0.0021	0.0470	0.0000
	bS	149	0.908656	-0.038002	-0.427857	-0.0005	0.0911	0.0000
17	bF	126	0.809946	1.341591	-3.125220	0.0065	-0.1080	0.6292
	bS	29	0.984112	-0.561918	0.158810	0.0017	0.0370	0.0000
18	bF	138	0.980479	-0.257869	-0.383703	0.0016	0.0030	0.0000
	bS	55	0.911441	0.061013	-0.798157	-0.0003	0.0647	0.0000
19	bF	83	0.787487	0.346134	-0.676701	0.0019	0.1890	0.0000
	bS	96	0.701274	1.159340	-1.835772	0.0031	0.0000	0.6746

Table 5. Net Merchantable Volume Table Statistics
Total Decay Deducted

Unit	Species	No. of trees	Volume coefficients a	b	c	Error coefficients d	e	f
2	bF	57	0.915611	0.183372	-0.665173	0.0009	0.0000	0.1518
	bS	126	0.942767	0.028962	-0.531232	0.0012	0.0049	0.0000
4	bF	66	0.780190	0.816400	-1.589100	-0.0002	-0.0237	0.6640
	bS	184	0.948060	-0.086100	-0.365800	0.0007	-0.0259	0.1627
5	bF	115	0.850100	0.409821	-0.874611	0.0020	0.1476	-0.2633
	bS	197	0.940621	0.032818	-0.405734	0.0001	0.0267	0.0000
6	bF	166	0.887024	0.216475	-0.672236	0.0009	0.0685	0.0000
	bS	152	0.864270	0.334498	-0.772774	0.0011	0.0000	0.3475
7	bF	166	0.887024	0.216475	-0.672236	0.0009	0.0685	0.0000
	bS	152	0.864270	0.334498	-0.772774	0.0011	0.0000	0.3475
8	bF	115	0.850100	0.409821	-0.874611	0.0020	0.1476	-0.2633
	bS	197	0.978075	-0.200146	-0.112097	0.0014	0.0075	0.0000
9	bF	110	0.972835	-0.542900	0.333455	0.0038	0.0436	0.0000
	bS	290	0.897268	-0.096791	0.001621	0.0030	0.0000	0.3297
10	bF	89	0.768444	1.115632	-1.960481	0.0013	0.0000	0.3624
	bS	148	0.924188	0.102932	-0.582527	0.0153	-0.3726	2.7448
11	bF	114	0.936979	0.240659	-1.406919	-0.0003	0.0665	-0.3396
	bS	164	6.960279	-0.142844	-0.292426	0.0012	0.0223	0.0000
12	bF	89	0.768444	1.115632	-1.960481	0.0013	0.0000	0.3624
	bS	74	0.489209	2.939971	-4.414741	0.0153	-0.3727	2.7448
13	bF	97	0.723810	0.971500	-1.622800	-0.0002	0.0422	-0.0179
	bS	96	0.856990	0.34400	-0.865800	-0.0009	0.0269	-0.0711
14	bF	263	0.935778	-0.115205	0.027522	0.0012	0.0356	0.0000
	bS	59	0.977610	-0.315370	-0.029171	0.0004	-0.2572	0.0000
15	bF	347	0.953948	-0.159629	-0.182723	0.0002	0.0414	0.0000
	bS	69	1.109452	-1.735624	2.006679	0.0071	0.0284	0.0000
16	bF	159	0.941768	-0.484638	0.392861	0.0020	0.0438	0.0000
	bS	149	0.896654	0.052641	-0.507267	0.0010	0.0770	0.0000
17	bF	126	0.813567	0.980090	-0.226609	0.0113	0.0000	0.0778
	bS	29	0.986011	-0.505253	0.042761			
18	bF	138	0.985726	-0.358317	-0.174989	0.0016	0.0057	0.0000
	bS	55	0.968597	-0.292993	0.312393	0.0062	0.0201	0.0000
19	bF	83	0.908461	-0.255103	0.165015	0.0026	0.0852	0.0000
	bS	96	0.950695	0.360081	-0.819507	-0.0012	0.0867	0.0000

Table 6. Net Merchantable Volume Table Statistics
Advanced Decay Deducted

Unit	Species	No. of trees	Volume coefficients a	b	c	Error coefficients d	e	f
2	bF	57	0.966498	0.107434	-0.324945	0.0013	0.0000	0.0198
	bS	126	0.945968	0.019518	-0.519935	0.0012	0.0020	0.0000
4	bF	66	0.858830	0.392400	-0.965200	0.0019	0.7638	0.4991
	bS	184	0.953580	-0.041800	-0.439100	0.0005	-0.0209	0.1365
5	bF	115	0.901522	0.164141	-0.549204	0.0003	0.0926	0.0000
	bS	197	0.944610	-0.018878	-0.390905	0.0001	0.0225	0.0000
6	bF	166	0.905846	0.173367	-0.621047	0.0008	0.0492	0.0000
	bS	152	0.924525	0.039223	-0.412251	0.0024	0.0665	0.0000
7	bF	166	0.905846	0.173367	-0.621047	0.0008	0.0492	0.0000
	bS	152	0.924525	0.039223	-0.412251	0.0024	0.0665	0.0000
8	bF	115	0.901522	0.164141	-0.549204	0.0003	0.0926	0.0000
	bS	197	0.976382	-0.161174	-0.167100	0.0014	0.0041	0.0000
9	bF	110	0.979583	-0.462191	0.197220	0.0032	0.0252	0.0000
	bS	290	0.932801	-0.176705	0.002970	-0.0005	0.0657	0.0000
10	bF	89	0.896379	0.272487	-0.799776	-0.0001	0.0417	0.0000
	bS	148	0.936399	0.076025	-0.565024	0.0001	0.0281	0.0000
11	bF	114	0.937231	0.231801	-1.174026	-0.0012	0.0625	-0.3201
	bS	164	0.972818	-0.097782	-0.373526	0.0006	0.0094	-0.2407
12	bF	89	0.896379	0.272487	-0.799776	-0.0001	0.0417	0.0000
	bS	74	0.507389	2.857528	-4.304641	0.0146	-0.3509	2.5313
13	bF	97	0.834760	0.562400	-1.16200	-0.0019	0.0480	-0.1359
	bS	96	0.926930	0.076200	-0.553500	-0.0001	0.0284	-0.0967
14	bF	263	0.976872	-0.257218	0.064213	0.0015	0.0106	0.0000
	bS	59	0.978349	-0.278794	-0.091698	0.0052	0.0174	0.0000
15	bF	347	0.975469	-0.144879	-0.270899	0.0009	0.0095	0.0000
	bS	69	1.049975	-0.925518	0.792602	0.0026	0.0179	0.0000
16	bF	159	0.974741	-0.330796	0.000531	0.0009	0.0103	0.0000
	bS	149	0.953879	-0.091135	-0.371113	0.0003	0.0172	0.0000
17	bF	126	0.943344	0.098636	-0.803340	0.0007	0.0000	0.0738
	bS	29	0.975024	-0.217402	-0.332888	0.0082	0.0021	0.0000
18	bF	138	0.978524	-0.205985	-0.419840	0.0017	0.0008	0.0000
	bS	55	0.969443	-0.205121	-0.448269	0.0007	0.0083	0.0000
19	bF	83	0.930032	-0.124450	-0.204408	0.0016	0.0529	0.0000
	bS	96	0.870322	0.352411	-0.879917	0.0017	0.0000	0.2471

APPENDIX I

Total Volume (cubic metres)
Balsam Fir
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	0.011	0.022	0.032	0.042	0.051	0.060	0.069	0.077	
12	0.016	0.032	0.047	0.061	0.074	0.087	0.099	0.111	
14	0.022	0.043	0.063	0.082	0.101	0.118	0.135	0.151	0.166
16	0.029	0.057	0.083	0.108	0.132	0.154	0.176	0.197	0.217
18		0.072	0.105	0.136	0.166	0.195	0.223	0.249	0.274
20		0.088	0.129	0.168	0.206	0.241	0.275	0.308	0.339
22		0.107	0.156	0.204	0.249	0.292	0.333	0.372	0.410
24		0.127	0.186	0.242	0.296	0.347	0.396	0.443	0.488
26			0.218	0.284	0.347	0.407	0.465	0.520	0.573
28			0.253	0.330	0.403	0.473	0.539	0.603	0.664
30			0.291	0.379	0.462	0.542	0.619	0.692	0.762
32			0.331	0.431	0.526	0.617	0.704	0.788	0.867
34			0.374	0.486	0.594	0.697	0.795	0.889	0.979
36			0.419	0.545	0.666	0.781	0.891	0.997	1.098
38				0.607	0.742	0.870	0.993	1.111	1.223
40				0.673	0.822	0.964	1.100	1.231	1.355
42				0.742	0.906	1.063	1.213	1.357	1.494
44				0.814	0.995	1.167	1.331	1.489	1.640
46				0.890	1.087	1.275	1.455	1.627	1.792
48				0.969	1.184	1.389	1.585	1.772	1.952
50				1.052	1.284	1.507	1.719	1.923	2.118
52				1.138	1.389	1.630	1.860	2.080	2.290
54				1.227	1.498	1.757	2.005	2.243	2.470
56				1.319	1.611	1.890	2.157	2.412	2.656
58						2.027	2.313	2.587	2.849
60						2.170	2.476	2.769	3.049

a = 223.3887
b = 25844.5590

APPENDIX I (Cont'd.)

Percent Error in Total Volume
Balsam Fir
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	-1.8	3.1	4.8	5.6	6.1	6.4	6.7	6.8	
12	1.3	4.7	5.9	6.4	6.8	7.0	7.2	7.3	
14	3.2	5.7	6.5	6.9	7.2	7.4	7.5	7.6	7.6
16	4.4	6.3	7.0	7.3	7.5	7.6	7.7	7.8	7.8
18		6.7	7.2	7.5	7.6	7.8	7.8	7.9	7.9
20		7.0	7.5	7.7	7.8	7.9	7.9	8.0	8.0
22		7.3	7.6	7.8	7.9	7.9	8.0	8.0	8.1
24		7.4	7.7	7.9	8.0	8.0	8.0	8.1	8.1
26			7.8	7.9	8.0	8.1	8.1	8.1	8.1
28			7.9	8.0	8.1	8.1	8.1	8.1	8.2
30			7.9	8.0	8.1	8.1	8.2	8.2	8.2
32			8.0	8.1	8.1	8.2	8.2	8.2	8.2
34			8.0	8.1	8.1	8.2	8.2	8.2	8.2
36			8.1	8.1	8.2	8.2	8.2	8.2	8.2
38				8.1	8.2	8.2	8.2	8.2	8.2
40				8.2	8.2	8.2	8.2	8.2	8.3
42				8.2	8.2	8.2	8.2	8.3	8.3
44				8.2	8.2	8.2	8.3	8.3	8.3
46				8.2	8.2	8.2	8.3	8.3	8.3
48				8.2	8.2	8.3	8.3	8.3	8.3
50				8.2	8.2	8.3	8.3	8.3	8.3
52				8.2	8.3	8.3	8.3	8.3	8.3
54				8.2	8.3	8.3	8.3	8.3	8.3
56				8.3	8.3	8.3	8.3	8.3	8.3
58						8.3	8.3	8.3	8.3
60						8.3	8.3	8.3	8.3

d = -0.0011
e = 0.0834
f = 0.0000

APPENDIX I (Cont'd.)

Gross Merchantable Volume (cubic metres)
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Balsam Fir
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	0.009	0.017	0.026	0.033	0.041	0.048	0.055	0.061	
12	0.014	0.028	0.041	0.053	0.065	0.076	0.087	0.097	
14	0.020	0.039	0.058	0.075	0.092	0.108	0.123	0.138	0.152
16	0.027	0.053	0.077	0.101	0.123	0.144	0.164	0.184	0.203
18		0.068	0.099	0.129	0.157	0.185	0.211	0.236	0.259
20		0.084	0.123	0.160	0.196	0.230	0.262	0.293	0.323
22		0.102	0.150	0.195	0.238	0.279	0.318	0.356	0.392
24		0.122	0.179	0.233	0.284	0.333	0.380	0.425	0.468
26			0.210	0.274	0.334	0.392	0.447	0.500	0.551
28			0.244	0.318	0.388	0.455	0.520	0.581	0.640
30			0.281	0.365	0.446	0.524	0.597	0.668	0.736
32			0.320	0.416	0.508	0.596	0.680	0.761	0.838
34			0.361	0.470	0.574	0.674	0.769	0.860	0.947
36			0.405	0.528	0.644	0.756	0.862	0.964	1.062
38				0.588	0.718	0.843	0.961	1.075	1.184
40				0.652	0.796	0.934	1.066	1.192	1.313
42				0.719	0.878	1.030	1.175	1.315	1.448
44				0.789	0.964	1.131	1.290	1.443	1.589
46				0.863	1.054	1.236	1.411	1.578	1.738
48				0.940	1.148	1.347	1.537	1.718	1.892
50				1.020	1.246	1.461	1.668	1.865	2.054
52				1.103	1.348	1.581	1.804	2.017	2.222
54				1.190	1.454	1.705	1.946	2.176	2.396
56				1.280	1.563	1.834	2.093	2.340	2.578
58						1.968	2.245	2.511	2.765
60						2.106	2.403	2.687	2.960

a = 0.9720
b = -0.0797
c = -0.3845

APPENDIX I (Cont'd.)

Percent Error of Merchantable Volume
Balsam Fir
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	10.5	5.4	3.7	2.8	2.3	2.0	1.8	1.6	
12	6.6	3.4	2.3	1.8	1.5	1.3	1.2	1.1	
14	4.6	2.4	1.7	1.3	1.1	1.0	0.9	0.8	0.8
16	3.5	1.8	1.3	1.0	0.9	0.8	0.7	0.7	0.7
18		1.4	1.0	0.9	0.8	0.7	0.7	0.6	0.6
20		1.2	0.9	0.7	0.7	0.6	0.6	0.6	0.6
22		1.0	0.8	0.7	0.6	0.6	0.6	0.6	0.6
24		0.9	0.7	0.6	0.6	0.6	0.6	0.6	0.7
26			0.7	0.6	0.6	0.6	0.7	0.7	0.7
28			0.6	0.6	0.6	0.7	0.7	0.7	0.8
30			0.6	0.6	0.7	0.7	0.8	0.8	0.9
32			0.6	0.6	0.7	0.8	0.8	0.9	1.0
34			0.6	0.7	0.7	0.8	0.9	1.0	1.1
36			0.6	0.7	0.8	0.9	1.0	1.1	1.2
38				0.8	0.9	1.0	1.1	1.2	1.3
40				0.8	0.9	1.0	1.2	1.3	1.4
42				0.9	1.0	1.1	1.3	1.4	1.5
44				0.9	1.1	1.2	1.4	1.5	1.7
46				1.0	1.2	1.3	1.5	1.7	1.8
48				1.1	1.2	1.4	1.6	1.8	2.0
50				1.1	1.3	1.5	1.7	1.9	2.1
52				1.2	1.4	1.7	1.9	2.1	2.3
54				1.3	1.5	1.8	2.0	2.2	2.5
56				1.4	1.6	1.9	2.2	2.4	2.6
58						2.0	2.3	2.6	2.8
60						2.2	2.5	2.8	3.0

d = 0.0009
e = 0.0000
f = 0.0101

APPENDIX I (Cont'd.)

Net Merchantable Volume Cull Deducted (cubic metres)
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Balsam Fir
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	0.008	0.015	0.023	0.030	0.036	0.043	0.049	0.055	
12	0.014	0.028	0.041	0.053	0.065	0.076	0.087	0.097	
14	0.020	0.039	0.058	0.075	0.092	0.108	0.123	0.138	0.152
16	0.026	0.051	0.074	0.097	0.118	0.139	0.158	0.177	0.195
18		0.062	0.090	0.117	0.143	0.168	0.192	0.214	0.236
20		0.073	0.107	0.139	0.169	0.199	0.227	0.253	0.279
22		0.085	0.124	0.161	0.197	0.231	0.264	0.295	0.325
24		0.098	0.143	0.186	0.227	0.266	0.303	0.339	0.373
26			0.162	0.211	0.258	0.302	0.345	0.386	0.425
28			0.183	0.239	0.291	0.342	0.390	0.436	0.480
30			0.206	0.268	0.327	0.384	0.438	0.489	0.539
32			0.230	0.299	0.365	0.428	0.488	0.546	0.601
34			0.255	0.332	0.405	0.475	0.542	0.606	0.668
36			0.282	0.367	0.448	0.525	0.599	0.670	0.738
38				0.403	0.492	0.577	0.659	0.737	0.811
40				0.442	0.539	0.633	0.722	0.807	0.889
42				0.482	0.589	0.691	0.788	0.881	0.970
44				0.525	0.641	0.751	0.857	0.959	1.056
46				0.569	0.695	0.815	0.930	1.040	1.145
48				0.615	0.751	0.881	1.005	1.124	1.238
50				0.663	0.810	0.950	1.084	1.212	1.335
52				0.714	0.871	1.022	1.166	1.304	1.436
54				0.766	0.935	1.097	1.251	1.399	1.541
56				0.820	1.001	1.174	1.340	1.498	1.650
58						1.254	1.431	1.600	1.762
60						1.337	1.526	1.706	1.879

a = 0.5825
b = 2.1408
c = -3.3034

APPENDIX I (Cont'd.)

Percent Merchantable Volume Cull
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Balsam Fir
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	15.0	12.4	11.6	11.2	11.0	10.9	10.8	10.7	
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2.9	3.4	3.6	3.7	3.7	3.8	3.8	3.8	3.8
18		8.6	8.8	8.9	8.9	8.9	9.0	9.0	9.0
20		13.1	13.3	13.4	13.4	13.4	13.5	13.5	13.5
22		16.9	17.0	17.1	17.2	17.2	17.2	17.2	17.2
24		20.0	20.1	20.2	20.3	20.3	20.3	20.3	20.3
26			22.7	22.8	22.8	22.8	22.9	22.9	22.9
28			24.8	24.9	24.9	25.0	25.0	25.0	25.0
30			26.6	26.7	26.7	26.7	26.7	26.8	26.8
32			28.1	28.2	28.2	28.2	28.2	28.2	28.2
34			29.4	29.4	29.5	29.5	29.5	29.5	29.5
36			30.5	30.5	30.5	30.5	30.6	30.6	30.6
38				31.4	31.5	31.5	31.5	31.5	31.5
40				32.2	32.3	32.3	32.3	32.3	32.3
42				32.9	32.9	33.0	33.0	33.0	33.0
44				33.5	33.6	33.6	33.6	33.6	33.6
46				34.1	34.1	34.1	34.1	34.1	34.1
48				34.5	34.6	34.6	34.6	34.6	34.6
50				35.0	35.0	35.0	35.0	35.0	35.0
52				35.3	35.3	35.4	35.4	35.4	35.4
54				35.7	35.7	35.7	35.7	35.7	35.7
56				36.0	36.0	36.0	36.0	36.0	36.0
58						36.3	36.3	36.3	36.3
60						36.5	36.5	36.5	36.5

a = 0.5825
b = 2.1468
c = -3.3034

APPENDIX I (Cont'd.)

Net Merchantable Volume Total Decay Deducted (cubic metres)
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Balsam Fir
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	0.008	0.016	0.024	0.032	0.039	0.045	0.052	0.058	
12	0.014	0.028	0.041	0.053	0.065	0.076	0.087	0.097	
14	0.020	0.039	0.058	0.075	0.092	0.108	0.123	0.138	0.152
16	0.027	0.052	0.076	0.099	0.121	0.142	0.162	0.181	0.200
18		0.065	0.095	0.123	0.151	0.177	0.202	0.226	0.248
20		0.079	0.115	0.150	0.183	0.214	0.245	0.274	0.301
22		0.094	0.137	0.178	0.217	0.255	0.291	0.325	0.358
24		0.110	0.160	0.209	0.255	0.299	0.341	0.381	0.420
26			0.186	0.242	0.295	0.346	0.395	0.442	0.487
28			0.213	0.277	0.339	0.397	0.453	0.507	0.558
30			0.242	0.315	0.385	0.452	0.515	0.576	0.634
32			0.273	0.356	0.434	0.510	0.581	0.650	0.716
34			0.306	0.399	0.487	0.571	0.652	0.729	0.802
36			0.341	0.444	0.542	0.636	0.726	0.812	0.894
38				0.492	0.601	0.705	0.805	0.900	0.991
40				0.543	0.663	0.778	0.887	0.992	1.093
42				0.596	0.728	0.854	0.974	1.090	1.200
44				0.652	0.796	0.934	1.065	1.191	1.312
46				0.710	0.867	1.017	1.161	1.298	1.430
48				0.771	0.942	1.105	1.260	1.409	1.552
50				0.834	1.019	1.195	1.364	1.525	1.680
52				0.901	1.100	1.290	1.472	1.646	1.813
54				0.969	1.184	1.388	1.584	1.771	1.951
56				1.040	1.270	1.490	1.700	1.902	2.094
58						1.596	1.821	2.036	2.243
60						1.705	1.946	2.176	2.397

a = 0.7684
b = 1.1156
c = -1.9605

APPENDIX I (Cont'd.)

Percent Merchantable Volume Total Decay
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Balsam Fir
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	7.5	6.1	5.7	5.5	5.4	5.3	5.2	5.2	
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.9	1.2	1.3	1.4	1.4	1.4	1.4	1.4	1.4
18		4.0	4.1	4.1	4.2	4.2	4.2	4.2	4.2
20		6.4	6.5	6.6	6.6	6.6	6.6	6.6	6.6
22		8.5	8.5	8.6	8.6	8.6	8.6	8.6	8.7
24		10.1	10.2	10.3	10.3	10.3	10.3	10.3	10.3
26			11.6	11.6	11.6	11.7	11.7	11.7	11.7
28			12.7	12.8	12.8	12.8	12.8	12.8	12.8
30			13.7	13.7	13.7	13.8	13.8	13.8	13.8
32			14.5	14.5	14.5	14.6	14.6	14.6	14.6
34			15.2	15.2	15.2	15.2	15.2	15.2	15.2
36			15.8	15.8	15.8	15.8	15.8	15.8	15.8
38				16.3	16.3	16.3	16.3	16.3	16.3
40				16.7	16.7	16.7	16.7	16.7	16.7
42				17.1	17.1	17.1	17.1	17.1	17.1
44				17.4	17.4	17.4	17.4	17.4	17.4
46				17.7	17.7	17.7	17.7	17.7	17.7
48				18.0	18.0	18.0	18.0	18.0	18.0
50				18.2	18.2	18.2	18.2	18.2	18.2
52				18.4	18.4	18.4	18.4	18.4	18.4
54				18.6	18.6	18.6	18.6	18.6	18.6
56				18.7	18.7	18.7	18.7	18.7	18.7
58						18.9	18.9	18.9	18.9
60						19.0	19.0	19.0	19.0

a = 0.7684
b = 1.1156
c = -1.9605

APPENDIX I (Cont'd.)

Net Merchantable Volume Advanced Decay Deducted (cubic metres)
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Balsam Fir
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	0.009	0.017	0.025	0.033	0.040	0.047	0.054	0.060	
12	0.014	0.028	0.041	0.053	0.065	0.076	0.087	0.097	
14	0.020	0.039	0.057	0.075	0.091	0.107	0.122	0.137	0.151
16	0.027	0.052	0.076	0.099	0.121	0.141	0.161	0.181	0.199
18		0.066	0.096	0.125	0.153	0.180	0.205	0.229	0.252
20		0.081	0.119	0.155	0.189	0.222	0.253	0.283	0.311
22		0.098	0.144	0.187	0.228	0.268	0.305	0.342	0.376
24		0.116	0.170	0.222	0.271	0.318	0.363	0.406	0.447
26			0.200	0.260	0.317	0.372	0.425	0.475	0.523
28			0.231	0.301	0.367	0.431	0.492	0.550	0.606
30			0.265	0.345	0.421	0.494	0.564	0.630	0.694
32			0.301	0.392	0.478	0.561	0.640	0.716	0.789
34			0.339	0.442	0.539	0.633	0.722	0.807	0.889
36			0.380	0.495	0.604	0.708	0.808	0.904	0.996
38				0.550	0.672	0.789	0.900	1.006	1.108
40				0.609	0.744	0.873	0.996	1.114	1.227
42				0.671	0.820	0.962	1.097	1.227	1.351
44				0.736	0.899	1.055	1.203	1.346	1.482
46				0.804	0.982	1.152	1.314	1.470	1.619
48				0.875	1.069	1.254	1.430	1.600	1.762
50				0.949	1.159	1.360	1.551	1.735	1.911
52				1.026	1.253	1.470	1.677	1.876	2.066
54				1.106	1.351	1.584	1.808	2.022	2.227
56				1.189	1.452	1.703	1.944	2.173	2.394
58						1.826	2.084	2.331	2.567
60						1.954	2.230	2.493	2.746

a = 0.8964
b = 0.2725
c = -0.7998

APPENDIX I (Cont'd.)

Percent Merchantable Volume Advanced Decay
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Balsam Fir
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	1.9	1.6	1.5	1.5	1.4	1.4	1.4	1.4	
12	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
14	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
16	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
18		2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
20		3.4	3.4	3.5	3.5	3.5	3.5	3.5	3.5
22		4.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1
24		4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
26			5.0	5.0	5.0	5.0	5.0	5.0	5.0
28			5.3	5.4	5.4	5.4	5.4	5.4	5.4
30			5.6	5.6	5.6	5.7	5.7	5.7	5.7
32			5.9	5.9	5.9	5.9	5.9	5.9	5.9
34			6.1	6.1	6.1	6.1	6.1	6.1	6.1
36			6.3	6.3	6.3	6.3	6.3	6.3	6.3
38				6.4	6.4	6.4	6.4	6.4	6.4
40				6.5	6.5	6.5	6.5	6.5	6.5
42				6.6	6.6	6.6	6.6	6.7	6.7
44				6.7	6.7	6.7	6.7	6.7	6.7
46				6.8	6.8	6.8	6.8	6.8	6.8
48				6.9	6.9	6.9	6.9	6.9	6.9
50				7.0	7.0	7.0	7.0	7.0	7.0
52				7.0	7.0	7.0	7.0	7.0	7.0
54				7.1	7.1	7.1	7.1	7.1	7.1
56				7.1	7.1	7.1	7.1	7.1	7.1
58						7.2	7.2	7.2	7.2
60						7.2	7.2	7.2	7.2

a = 0.8964
b = 0.2725
c = -1.7998

APPENDIX I (Cont'd.)

Percent Difference in Total Volume using Kerr Coefficient
Balsam Fir
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	-16.8	-12.4	-8.5	-5.1	-2.0	0.8	3.3	5.6	
12	-16.8	-12.4	-8.5	-5.1	-2.0	0.8	3.3	5.6	
14	-16.8	-12.4	-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
16	-16.8	-12.4	-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
18		-12.4	-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
20		-12.4	-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
22		-12.4	-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
24		-12.4	-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
26			-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
28			-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
30			-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
32			-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
34			-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
36			-8.5	-5.1	-2.0	0.8	3.3	5.6	7.8
38				-5.1	-2.0	0.8	3.3	5.6	7.8
40				-5.1	-2.0	0.8	3.3	5.6	7.8
42				-5.1	-2.0	0.8	3.3	5.6	7.8
44				-5.1	-2.0	0.8	3.3	5.6	7.8
46				-5.1	-2.0	0.8	3.3	5.6	7.8
48				-5.1	-2.0	0.8	3.3	5.6	7.8
50				-5.1	-2.0	0.8	3.3	5.6	7.8
52				-5.1	-2.0	0.8	3.3	5.6	7.8
54				-5.1	-2.0	0.8	3.3	5.6	7.8
56				-5.1	-2.0	0.8	3.3	5.6	7.8
58						0.8	3.3	5.6	7.8
60						0.8	3.3	5.6	7.8

APPENDIX I (Cont'd.)

Total volume (cubic metres)
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	0.013	0.024	0.034	0.043	0.050	0.057	0.063	0.069	
12	0.019	0.035	0.049	0.061	0.072	0.082	0.091	0.099	
14	0.026	0.048	0.067	0.084	0.099	0.112	0.124	0.135	0.145
16	0.033	0.062	0.087	0.109	0.129	0.146	0.162	0.176	0.189
18		0.079	0.110	0.138	0.163	0.185	0.205	0.223	0.239
20		0.097	0.136	0.171	0.201	0.228	0.253	0.275	0.295
22		0.117	0.165	0.206	0.243	0.276	0.306	0.333	0.357
24		0.140	0.196	0.246	0.290	0.329	0.364	0.396	0.425
26			0.230	0.288	0.340	0.386	0.427	0.465	0.499
28			0.267	0.334	0.394	0.448	0.496	0.539	0.578
30			0.306	0.384	0.453	0.514	0.569	0.619	0.664
32			0.349	0.437	0.515	0.585	0.647	0.704	0.755
34			0.394	0.493	0.581	0.660	0.731	0.795	0.853
36			0.441	0.553	0.652	0.740	0.819	0.891	0.956
38				0.616	0.726	0.825	0.913	0.993	1.065
40				0.683	0.805	0.914	1.012	1.100	1.180
42				0.752	0.887	1.007	1.115	1.213	1.301
44				0.826	0.974	1.106	1.224	1.331	1.428
46				0.903	1.064	1.208	1.338	1.455	1.561
48				0.983	1.159	1.316	1.457	1.584	1.699
50				1.066	1.257	1.428	1.581	1.719	1.844
52				1.153	1.360	1.544	1.710	1.859	1.994
54				1.244	1.467	1.665	1.844	2.005	2.151
56				1.338	1.577	1.791	1.983	2.156	2.313
58						1.921	2.127	2.313	2.481
60						2.056	2.276	2.475	2.655

a = 564.9429
b = 21351.5480

APPENDIX I (Cont'd.)

Percent Error in Total Volume
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	25.9	14.4	10.7	9.0	8.1	7.5	7.1	6.9	
12	18.2	10.5	8.2	7.2	6.7	6.5	6.3	6.3	
14	13.8	8.4	6.9	6.4	6.3	6.3	6.4	6.5	6.6
16	10.9	7.2	6.4	6.3	6.4	6.6	6.9	7.1	7.4
18		6.6	6.3	6.5	6.9	7.3	7.7	8.1	8.5
20		6.3	6.5	7.0	7.6	8.2	8.8	9.4	9.9
22		6.3	6.9	7.7	8.6	9.4	10.2	10.9	11.5
24		6.5	7.5	8.6	9.7	10.8	11.7	12.6	13.4
26			8.3	9.7	11.1	12.3	13.5	14.5	15.5
28			9.2	10.9	12.5	14.0	15.4	16.6	17.7
30			10.2	12.3	14.2	15.9	17.5	18.9	20.2
32			11.3	13.7	15.9	17.9	19.7	21.4	22.9
34			12.5	15.3	17.8	20.1	22.1	24.0	25.7
36			13.8	17.0	19.9	22.4	24.7	26.8	28.7
38				18.8	22.0	24.9	27.5	29.8	31.9
40				20.7	24.3	27.5	30.3	32.9	35.3
42				22.8	26.7	30.2	33.4	36.3	38.9
44				24.9	29.2	33.1	36.6	39.7	42.6
46				27.2	31.9	36.1	39.9	43.4	46.5
48				29.5	34.7	39.3	43.5	47.2	50.6
50				32.0	37.6	42.6	47.1	51.2	54.9
52				34.5	40.6	46.0	50.9	55.3	59.4
54				37.2	43.7	49.6	54.9	59.7	64.0
56				39.9	47.0	53.3	59.0	64.1	68.8
58						57.2	63.3	68.8	73.8
60						61.2	67.7	73.6	78.9

d = 0.0033
e = 0.0000
f = 0.2968

APPENDIX I (Cont'd.)

Gross Merchantable Volume (cubic metres)
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	0.011	0.020	0.028	0.035	0.041	0.047	0.052	0.056	
12	0.016	0.031	0.043	0.054	0.064	0.073	0.080	0.088	
14	0.023	0.043	0.061	0.076	0.090	0.102	0.113	0.123	0.132
16	0.031	0.058	0.081	0.102	0.120	0.136	0.151	0.164	0.176
18		0.074	0.104	0.130	0.154	0.175	0.193	0.210	0.226
20		0.092	0.129	0.162	0.191	0.217	0.240	0.261	0.281
22		0.112	0.157	0.197	0.233	0.264	0.292	0.318	0.341
24		0.134	0.188	0.236	0.278	0.316	0.349	0.380	0.408
26			0.221	0.277	0.327	0.371	0.411	0.447	0.480
28			0.257	0.322	0.380	0.432	0.478	0.520	0.558
30			0.296	0.371	0.437	0.496	0.550	0.598	0.641
32			0.337	0.422	0.498	0.566	0.626	0.681	0.731
34			0.381	0.477	0.563	0.639	0.708	0.770	0.826
36			0.428	0.536	0.632	0.717	0.794	0.864	0.927
38				0.597	0.704	0.800	0.886	0.963	1.033
40				0.662	0.781	0.887	0.982	1.068	1.145
42				0.731	0.862	0.978	1.083	1.178	1.264
44				0.802	0.946	1.074	1.189	1.293	1.387
46				0.877	1.034	1.175	1.300	1.414	1.517
48				0.956	1.127	1.279	1.416	1.540	1.652
50				1.037	1.223	1.389	1.537	1.672	1.794
52				1.122	1.323	1.502	1.663	1.809	1.940
54				1.210	1.427	1.620	1.794	1.951	2.093
56				1.302	1.535	1.743	1.930	2.099	2.252
58						1.870	2.071	2.252	2.416
60						2.002	2.216	2.410	2.586

a = 0.9761
b = -0.1437
c = -0.2099

APPENDIX I (Cont'd.)

Percent Error of Merchantable Volume
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	11.0	5.9	4.2	3.3	2.8	2.5	2.3	2.1	
12	7.1	3.8	2.7	2.2	1.9	1.6	1.5	1.4	
14	5.0	2.7	1.9	1.6	1.4	1.2	1.1	1.0	1.0
16	3.8	2.0	1.5	1.2	1.1	1.0	0.9	0.8	0.8
18		1.6	1.2	1.0	0.9	0.8	0.7	0.7	0.7
20		1.3	1.0	0.8	0.7	0.7	0.7	0.6	0.6
22		1.1	0.9	0.7	0.7	0.6	0.6	0.6	0.6
24		1.0	0.8	0.7	0.6	0.6	0.6	0.6	0.6
26			0.7	0.6	0.6	0.6	0.6	0.6	0.6
28			0.6	0.6	0.6	0.6	0.6	0.6	0.6
30			0.6	0.6	0.6	0.6	0.6	0.6	0.7
32			0.6	0.6	0.6	0.6	0.7	0.7	0.7
34			0.6	0.6	0.6	0.7	0.7	0.7	0.8
36			0.6	0.6	0.7	0.7	0.7	0.8	0.8
38				0.6	0.7	0.7	0.8	0.8	0.9
40				0.7	0.7	0.8	0.8	0.9	1.0
42				0.7	0.8	0.8	0.9	1.0	1.0
44				0.7	0.8	0.9	1.0	1.1	1.1
46				0.8	0.9	1.0	1.1	1.1	1.2
48				0.8	0.9	1.0	1.1	1.2	1.3
50				0.9	1.0	1.1	1.2	1.3	1.4
52				0.9	1.1	1.2	1.3	1.4	1.5
54				1.0	1.1	1.3	1.4	1.5	1.6
56				1.1	1.2	1.4	1.5	1.6	1.7
58						1.5	1.6	1.7	1.8
60						1.5	1.7	1.8	2.0

d = 0.0012
e = 0.0000
f = 0.0074

APPENDIX I (Cont'd.)

Net Merchantable Volume Cull Deducted (cubic metres)
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	0.008	0.016	0.023	0.029	0.034	0.039	0.043	0.047	
12	0.016	0.031	0.043	0.054	0.064	0.073	0.080	0.088	
14	0.023	0.043	0.061	0.076	0.090	0.102	0.113	0.123	0.132
16	0.030	0.056	0.078	0.097	0.114	0.130	0.144	0.156	0.168
18		0.063	0.088	0.111	0.130	0.148	0.164	0.178	0.191
20		0.070	0.098	0.123	0.145	0.164	0.181	0.197	0.212
22		0.077	0.107	0.134	0.158	0.179	0.198	0.216	0.231
24		0.083	0.116	0.146	0.171	0.194	0.215	0.234	0.251
26			0.126	0.157	0.185	0.210	0.232	0.252	0.270
28			0.135	0.169	0.199	0.225	0.249	0.271	0.291
30			0.145	0.181	0.213	0.241	0.267	0.290	0.311
32			0.154	0.193	0.227	0.258	0.286	0.310	0.333
34			0.165	0.206	0.243	0.276	0.305	0.331	0.355
36			0.176	0.220	0.259	0.294	0.325	0.353	0.379
38				0.234	0.276	0.313	0.346	0.376	0.403
40				0.249	0.293	0.333	0.368	0.400	0.429
42				0.264	0.311	0.353	0.391	0.425	0.456
44				0.280	0.330	0.375	0.415	0.451	0.484
46				0.297	0.350	0.397	0.440	0.478	0.513
48				0.315	0.371	0.421	0.466	0.506	0.543
50				0.333	0.392	0.445	0.493	0.535	0.574
52				0.352	0.414	0.470	0.520	0.566	0.607
54				0.371	0.437	0.496	0.549	0.597	0.641
56				0.392	0.461	0.524	0.580	0.630	0.676
58						0.552	0.611	0.664	0.712
60						0.581	0.643	0.699	0.750

a = 0.2137
b = 4.3491
c = -6.0870

APPENDIX I (Cont'd.)

Percent Merchantable Volume Cull
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	24.7	19.9	18.4	17.7	17.3	17.0	16.8	16.6	
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	3.0	4.0	4.4	4.6	4.7	4.8	4.8	4.9	4.9
18		14.6	15.0	15.1	15.3	15.3	15.4	15.4	15.5
20		23.8	24.1	24.3	24.4	24.5	24.5	24.6	24.6
22		31.5	31.8	31.9	32.0	32.1	32.1	32.2	32.2
24		37.8	38.1	38.2	38.3	38.4	38.4	38.4	38.5
26			43.3	43.4	43.5	43.5	43.6	43.6	43.6
28			47.6	47.7	47.8	47.8	47.8	47.9	47.9
30			51.2	51.3	51.3	51.4	51.4	51.4	51.4
32			54.2	54.3	54.3	54.4	54.4	54.4	54.4
34			56.7	56.8	56.9	56.9	56.9	56.9	57.0
36			58.9	59.0	59.0	59.1	59.1	59.1	59.1
38				60.8	60.9	60.9	60.9	60.9	60.9
40				62.4	62.5	62.5	62.5	62.5	62.5
42				63.8	63.9	63.9	63.9	63.9	63.9
44				65.1	65.1	65.1	65.1	65.1	65.1
46				66.1	66.2	66.2	66.2	66.2	66.2
48				67.1	67.1	67.1	67.1	67.1	67.1
50				67.9	67.9	68.0	68.0	68.0	68.0
52				68.7	68.7	68.7	68.7	68.7	68.7
54				69.3	69.3	69.4	69.4	69.4	69.4
56				69.9	69.9	70.0	70.0	70.0	70.0
58						70.5	70.5	70.5	70.5
60						71.0	71.0	71.0	71.0

a = 0.2137
b = 4.3491
c = -6.0870

APPENDIX I (Cont'd.)

Net Merchantable Volume Total Decay Deducted (cubic metres)
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	0.008	0.017	0.024	0.030	0.035	0.040	0.045	0.049	
12	0.016	0.031	0.043	0.054	0.064	0.073	0.080	0.088	
14	0.023	0.043	0.061	0.076	0.090	0.102	0.113	0.123	0.132
16	0.031	0.058	0.081	0.102	0.120	0.136	0.150	0.164	0.175
18		0.069	0.097	0.121	0.143	0.162	0.179	0.195	0.209
20		0.080	0.112	0.141	0.166	0.188	0.208	0.226	0.243
22		0.092	0.129	0.161	0.190	0.215	0.238	0.259	0.278
24		0.104	0.146	0.182	0.215	0.244	0.270	0.293	0.315
26			0.164	0.205	0.241	0.274	0.303	0.330	0.354
28			0.183	0.229	0.270	0.306	0.339	0.368	0.395
30			0.203	0.254	0.299	0.340	0.376	0.409	0.439
32			0.224	0.281	0.331	0.376	0.416	0.452	0.485
34			0.247	0.309	0.364	0.413	0.458	0.497	0.534
36			0.271	0.339	0.399	0.453	0.502	0.545	0.585
38				0.370	0.436	0.495	0.548	0.596	0.639
40				0.403	0.475	0.539	0.597	0.649	0.696
42				0.438	0.516	0.586	0.648	0.705	0.756
44				0.474	0.559	0.634	0.702	0.763	0.819
46				0.512	0.603	0.685	0.758	0.824	0.884
48				0.551	0.650	0.738	0.817	0.888	0.953
50				0.592	0.698	0.793	0.878	0.954	1.024
52				0.635	0.749	0.850	0.941	1.023	1.098
54				0.680	0.801	0.909	1.007	1.095	1.174
56				0.726	0.855	0.971	1.075	1.169	1.254
58						1.035	1.146	1.246	1.337
60						1.101	1.219	1.325	1.422

a = 0.4892
b = 2.9400
c = -4.4147

APPENDIX I (Cont'd.)

Percent Merchantable Volume Total Decay
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	20.2	16.6	15.4	14.9	14.5	14.3	14.1	14.0	
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.1	0.2	0.3	0.3	0.3	0.4	0.4
18		6.8	7.0	7.1	7.2	7.3	7.3	7.3	7.3
20		12.9	13.1	13.2	13.3	13.4	13.4	13.4	13.4
22		18.1	18.3	18.4	18.4	18.5	18.5	18.5	18.6
24		22.3	22.5	22.6	22.7	22.7	22.8	22.8	22.8
26			26.1	26.1	26.2	26.2	26.3	26.3	26.3
28			29.0	29.1	29.1	29.1	29.2	29.2	29.2
30			31.4	31.5	31.5	31.6	31.6	31.6	31.6
32			33.5	33.5	33.6	33.6	33.6	33.6	33.7
34			35.2	35.3	35.3	35.3	35.4	35.4	35.4
36			36.7	36.8	36.8	36.8	36.8	36.8	36.8
38				38.0	38.1	38.1	38.1	38.1	38.1
40				39.1	39.2	39.2	39.2	39.2	39.2
42				40.1	40.1	40.1	40.1	40.1	40.1
44				40.9	40.9	41.0	41.0	41.0	41.0
46				41.7	41.7	41.7	41.7	41.7	41.7
48				42.3	42.3	42.3	42.3	42.3	42.4
50				42.9	42.9	42.9	42.9	42.9	42.9
52				43.4	43.4	43.4	43.4	43.4	43.4
54				43.9	43.9	43.9	43.9	43.9	43.9
56				44.3	44.3	44.3	44.3	44.3	44.3
58						44.7	44.7	44.7	44.7
60						45.0	45.0	45.0	45.0

a = 0.4892
b = 2.9400
c = -4.4147

APPENDIX I (Cont'd.)

Net Merchantable Volume Advanced Decay Deducted (cubic metres)
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	0.009	0.017	0.024	0.030	0.036	0.041	0.045	0.049	
12	0.016	0.031	0.043	0.054	0.064	0.073	0.080	0.088	
14	0.023	0.043	0.061	0.076	0.090	0.102	0.113	0.123	0.132
16	0.031	0.058	0.081	0.102	0.120	0.136	0.151	0.164	0.176
18		0.070	0.098	0.122	0.144	0.163	0.181	0.196	0.211
20		0.081	0.114	0.142	0.167	0.190	0.210	0.229	0.245
22		0.093	0.130	0.163	0.192	0.218	0.241	0.262	0.281
24		0.106	0.148	0.185	0.218	0.247	0.274	0.298	0.319
26			0.166	0.208	0.245	0.279	0.308	0.335	0.360
28			0.186	0.233	0.275	0.312	0.345	0.375	0.402
30			0.207	0.259	0.305	0.347	0.384	0.417	0.447
32			0.229	0.287	0.338	0.384	0.425	0.462	0.495
34			0.252	0.316	0.372	0.423	0.468	0.509	0.546
36			0.277	0.347	0.409	0.464	0.514	0.559	0.599
38				0.379	0.447	0.508	0.562	0.611	0.655
40				0.414	0.488	0.553	0.613	0.666	0.715
42				0.450	0.530	0.601	0.666	0.724	0.777
44				0.487	0.574	0.652	0.721	0.784	0.841
46				0.526	0.620	0.704	0.780	0.848	0.909
48				0.567	0.669	0.759	0.840	0.914	0.980
50				0.610	0.719	0.816	0.903	0.982	1.054
52				0.654	0.771	0.875	0.969	1.054	1.130
54				0.700	0.825	0.937	1.037	1.128	1.210
56				0.748	0.882	1.001	1.108	1.205	1.293
58						1.067	1.182	1.285	1.378
60						1.136	1.257	1.367	1.467

a = 0.5074
b = 2.8575
c = -4.3046

APPENDIX I (Cont'd.)

Percent Merchantable Volume Advanced Decay
(Stump Height 0.1524 m, Top DIB 7.62 cm)
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	19.2	15.6	14.5	13.9	13.6	13.4	13.2	13.1	
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18		6.0	6.3	6.4	6.5	6.5	6.6	6.6	6.6
20		12.0	12.2	12.3	12.4	12.5	12.5	12.5	12.5
22		17.0	17.2	17.4	17.4	17.5	17.5	17.5	17.5
24		21.2	21.4	21.5	21.5	21.6	21.6	21.6	21.6
26			24.8	24.9	25.0	25.0	25.0	25.0	25.1
28			27.7	27.8	27.8	27.8	27.8	27.9	27.9
30			30.1	30.1	30.2	30.2	30.2	30.2	30.2
32			32.1	32.1	32.2	32.2	32.2	32.2	32.2
34			33.8	33.8	33.8	33.9	33.9	33.9	33.9
36			35.2	35.2	35.3	35.3	35.3	35.3	35.3
38				36.5	36.5	36.5	36.5	36.6	36.6
40				37.6	37.6	37.6	37.6	37.6	37.6
42				38.5	38.5	38.5	38.5	38.5	38.5
44				39.3	39.3	39.3	39.3	39.3	39.4
46				40.0	40.0	40.0	40.1	40.1	40.1
48				40.6	40.7	40.7	40.7	40.7	40.7
50				41.2	41.2	41.2	41.2	41.2	41.2
52				41.7	41.7	41.7	41.7	41.7	41.7
54				42.1	42.2	42.2	42.2	42.2	42.2
56				42.5	42.6	42.6	42.6	42.6	42.6
58						42.9	42.9	42.9	42.9
60						43.3	43.3	43.3	43.3

a = 0.5074
b = 2.8575
c = -4.3046

APPENDIX I (Cont'd.)

Percent Difference in Total Volume Using Kerr Coefficient
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	-15.4	-11.9	-9.0	-6.5	-4.5	-2.7	-1.2	0.2	
12	-15.4	-11.9	-9.0	-6.5	-4.5	-2.7	-1.2	0.2	
14	-15.4	-11.9	-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
16	-15.4	-11.9	-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
18		-11.9	-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
20		-11.9	-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
22		-11.9	-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
24		-11.9	-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
26			-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
28			-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
30			-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
32			-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
34			-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
36			-9.0	-6.5	-4.5	-2.7	-1.2	0.2	1.4
38				-6.5	-4.5	-2.7	-1.2	0.2	1.4
40				-6.5	-4.5	-2.7	-1.2	0.2	1.4
42				-6.5	-4.5	-2.7	-1.2	0.2	1.4
44				-6.5	-4.5	-2.7	-1.2	0.2	1.4
46				-6.5	-4.5	-2.7	-1.2	0.2	1.4
48				-6.5	-4.5	-2.7	-1.2	0.2	1.4
50				-6.5	-4.5	-2.7	-1.2	0.2	1.4
52				-6.5	-4.5	-2.7	-1.2	0.2	1.4
54				-6.5	-4.5	-2.7	-1.2	0.2	1.4
56				-6.5	-4.5	-2.7	-1.2	0.2	1.4
58						-2.7	-1.2	0.2	1.4
60						-2.7	-1.2	0.2	1.4

APPENDIX I (Cont'd.)

Percent Difference in Merchantable Volume Using Honer Taper
Black Spruce
Management Unit 12

DBHOB (cm)	Total Height (metres)								
	3	6	9	12	15	18	21	24	27
10	5.0	4.2	4.0	3.9	3.8	3.8	3.7	3.7	
12	-1.4	-1.6	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	
14	-2.7	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8
16	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7
18		-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3
20		-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8
22		-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
24		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
26			-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
28			-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
30			-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
32			-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
34			0.2	0.2	0.2	0.2	0.2	0.2	0.2
36			0.3	0.3	0.3	0.3	0.3	0.3	0.3
38				0.4	0.4	0.4	0.4	0.4	0.4
40				0.5	0.5	0.5	0.5	0.5	0.5
42				0.6	0.6	0.6	0.6	0.6	0.6
44				0.7	0.7	0.7	0.7	0.7	0.7
46				0.8	0.8	0.8	0.8	0.8	0.8
48				0.8	0.8	0.8	0.8	0.8	0.9
50				0.9	0.9	0.9	0.9	0.9	0.9
52				1.0	1.0	1.0	1.0	1.0	1.0
54				1.0	1.0	1.0	1.0	1.0	1.0
56				1.0	1.0	1.0	1.0	1.0	1.0
58						1.1	1.1	1.1	1.1
60						1.1	1.1	1.1	1.1